BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Foundation Diploma in Applied Science Pearson BTEC International Level 3 Diploma in Applied Science Pearson BTEC International Level 3 Diploma in Biomedical Science Pearson BTEC International Level 3 Diploma in Environmental Science Pearson BTEC International Level 3 Extended Diploma in Applied Science Pearson BTEC International Level 3 Extended Diploma in Biomedical Science Pearson BTEC International Level 3 Extended Diploma in Environmental Science
Unit number and title	**Unit 6: Principles and Applications of Chemistry II**
Learning aim(s)	**A:** Understand energy changes in chemical reactions
Assignment title	**Energy changes in chemical reactions**
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You are a laboratory technician working in a quality control laboratory. It is important for laboratory technicians and chemists working in manufacturing, research or service industries to have practical skills and an understanding of energy changes that take place during chemical reactions. Energy changes need to be taken into account for example when designing chemical plant in the manufacturing industry or the equipment/apparatus used to carry out a reaction in a research or quality control laboratory. Because of this your department regularly receives visits from schools, and your supervisor has allocated you the task of testing out an assessment that will be used by the 'BTEC students' undertaking work experience in your laboratory.

Task	Firstly, you will need to **carry out** produce a detailed report of a range of exothermic and endothermic **practical investigations**. These will be examples of where the energy change is transferred directly so that you are able to obtain the enthalpy change of the reaction by practical investigation. You should: • Research and identify suitable exothermic reactions with the agreement of your supervisor. • Calibrate the thermometers used, accurately measure and record measurements of temperature, masses and volume, and carry out a risk assessment. • Measure temperature changes of the solutions or water that absorb or release the heat due to the reaction.

	• Calculate values for enthalpy change for each reaction will be calculated using the equation $Q = mc_p\Delta T$ and converted to kJ mol^{-1} for comparison. Pay careful attention to sign conventions. • Categorise each reaction as endothermic or exothermic, commenting upon the magnitude and sign of the enthalpy change, and explaining the underlying processes involved in terms of bond breaking, bond making and reaction profile diagrams. Compare your practical investigation results for the exothermic and endothermic reactions to researched literature values for standard enthalpy changes. Coherently **discuss** any assumptions you have made, reaction conditions, problems or issues with procedures, sources of error in your measurements, percentage of errors in your equipment and your calculations of enthalpy changes which may not make your comparison valid. Comment on the magnitude and type of energy change, and **explain** the underlying bond breaking and making during the reaction, and present in an reaction profile diagram. Secondly, you will add to your report a study of reactions where the enthalpy change of the reaction can not be determined by practical investigation. Using supplied data, **calculate** standard enthalpy changes for a range of reactions not determined practically using a variety of methods. You should: • include Hess's energy cycles, average bond energies and standard enthalpy changes of combustion. • Use the difference between the average bond enthalpies of products and reactants **$\Delta H°_{reaction}$ = $\sum\Delta H°$ (products) - $\sum\Delta H°$ (reactants)** • Pay careful attention to sign conventions, symbols and units. • Coherently discuss the comparison of your calculated enthalpy change values with the literature values, providing a detailed commentary on the differences, including any assumptions which may not make the comparison valid.
Checklist of evidence required	A detailed report that includes: ● Practical investigations of a range of exothermic and endothermic reactions, explaining how the enthalpy changes arise. ● Calculations of standard enthalpy changes using given data for reactions not carried out practically ● A discussion which makes a comparison of the practical results obtained by experiment with researched literature values.

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria, you must show that you are able to:
A.D1	Discuss assumptions and sources of error in measurement and calculation of enthalpy changes.

A.M1	Calculate enthalpy changes for a range of reactions using Hess energy cycles, average bond energies and standard enthalpy changes of combustion.
A.P1	Investigate endothermic and exothermic reactions.
Sources of information to support you with this Assignment	All sources of information suggested are UK based. Centres are free to amend these sources to those available in the Country of delivery where more appropriate. www.edu.rsc.org - practical resources; - Nuffield chemistry practical collection www.STEM.org.uk - energetics Within the copyright laws learners could search YouTube for – energy changes during chemical reactions
Notes to the Assessor and technician	The practical activities suggested for this assignment are required to be safety checked by the Centre before use. Pearson Education can take no responsibility for the safety of any practical activities. Before doing any practical activity, you should always carry out your own risk assessment and refer to the necessary regulations. In particular, any local rules issued by your employer must be obeyed, regardless of what is suggested here. Centre should use Health and Safety information provided by a reputable source. In the UK such an example organization is CLEAPSS http://science.cleapss.org.uk/